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(71) Applicant

Grove Turkeys Limited (Ireland),  
Smithboro, County Monaghan, Ireland

(72) Inventors

Patrick Chalmers Liddle,  
Graham Spencer Woods

(74) Agent and/or Address for Service

Venner Shipley & Co., 368 City Road, London EC1V 2QA

(58) Field of search

A2B

(54) Heat stable emulsion and its use in a poultry product

(57) A heat stable, oil-in-water emulsion comprising an edible fat suspended in an aqueous medium and a stabilizer consisting of a mixture of a glycomannan and a polysaccharide hydrocolloid. The stabilizer is present in the emulsion at a concentration sufficient to maintain the emulsion in a pseudoplastic state below the set temperature of the stabilizer. The emulsion may be used to inject poultry meat prior to cooking to improve the organoleptic properties thereof.

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## SPECIFICATION

## Heat stable emulsion, process for its preparation and its use

The present invention relates to a heat stable emulsion, a process for its preparation and its use in the treatment of poultry meat. In particular, the invention relates to a heat stable oil-in-water emulsion for use in the injection of poultry meat prior to cooking to improve its organoleptic properties.

It is known from British Patent Specification No. 1,129,689 to inject a raw dressed poultry carcass with an edible fat so that the edible fat flows onto the skin during cooking from fat depots located beneath the skin. The edible fat may serve as a medium for introducing phosphates into the meat, which phosphates are suspended by agitation in the fat which is then injected into the carcass. The phosphates used are anhydrous polyphosphates. A problem encountered with this technique is the plugging of the needles used to inject the poultry such that the injection process breaks down. One explanation for this problem is that small amounts of water present in the equipment react with the anhydrous phosphate resulting in the hydration of the phosphate to form hard, rock-like structures which are too large to pass through the injection needles.

A solution to the above problem is proposed in Irish Patent Specification No. 38035 wherein a hydrated polyphosphoric acid salt of sodium or potassium is mixed with a liquid edible fat to suspend the salt and which suspension is then used to inject poultry without apparently the aforementioned disadvantage of plugging of the needles.

Irish Patent Specification No. 38036 discloses a process for injecting poultry meat with fat wherein the fat contains a minor portion of fat in the form of crystals but which acts as a liquid, such that congealment of the fat after injection is accelerated and there is less tendency for the fat to leak out of the injection sites after injection.

With all of these known processes there is a release of injected fat from the body of poultry meat essentially throughout the cooking process.

It is an object of the present invention to provide a process of injecting poultry meat to improve the organoleptic properties while at the same time simulating normal basting as carried out by a cook and which is normally carried out at the end of the roasting process so as to maximize the effect of basting.

The invention provides a stable oil-in-water emulsion which comprises an edible fat suspended in an aqueous medium and a stabilizer consisting of a mixture of a glycomannan and a polysaccharide hydrocolloid in a ratio of 10:90 to 90:10, said stabilizer being present in a quantity sufficient to maintain the emulsion in a pseudoplastic state below the set temperature of the stabilizer.

Preferably, the glycomannan is a glucomannan or a galactomannan.

Further, preferably, the galactomannan is locust bean gum, also known as carob-seed gum, or konjac gum, but especially locust bean gum.

Konjac gum is a glucomannan derived from *Amorphophallus konjac*. Other glucomannans derived from *Amorphophallus* species are also suitable for use in the emulsions according to the invention.

Preferably, the polysaccharide hydrocolloid is xanthan gum or carrageenan, especially xanthan gum.

Preferably, the ratio of glycomannan to polysaccharide hydrocolloid is in the range 80:20 to 20:80.

An especially preferred stabilizer is one comprising equal parts of locust bean gum and xanthan gum. Such a mixture is sold under the trade name FOODAID T and is supplied by Gel Systems Limited, London, United Kingdom.

Further, preferably, the stabilizer is present in the emulsion at a concentration in the range 0.05—1% by weight.

In any event, the stabilizer should be used at a level which is sufficient to permanently suspend and prevent coalescence of the oil droplets below the set temperature of the stabilizer after cold shear activation of the components of the emulsion.

The edible fat may be a saturated or polyunsaturated fat. A preferred saturated fat is butter whereas a preferred polyunsaturated fat is a vegetable oil such as corn oil.

Also, preferably, the fat is present in the emulsion at a concentration in the range 30—70% by weight.

The invention also provides a composition for the injection of a body of poultry meat to improve the organoleptic properties thereof, which composition comprises an emulsion as hereinabove defined.

Preferably, the body of poultry meat comprises a raw, dressed poultry carcass or a portion thereof or a pre-formed poultry meat. The preferred poultry is turkey or chicken.

According to a further aspect of the invention there is provided a process for preparing an emulsion as hereinbefore defined which comprises mixing the edible fat, aqueous medium and stabilizer in a high speed shear mixer.

According to a still further aspect of the invention there is provided a method for treating a body of poultry meat as hereinbefore defined, which method comprises injecting into said body, which has a temperature less than 40°F, an emulsion as hereinbefore defined.

Preferably, the body of poultry meat is injected with the emulsion at a concentration of less than 20% by weight of the body of meat, more particularly 1—10% and especially 2.5% by weight.

The aqueous medium may include a phosphate material as conventionally used in the treatment of poultry meat, more particularly a polyphosphate material.

The aqueous medium is preferably comprised of poultry stock which enhances the flavour of the

cooked meat.

The emulsion may also include a quantity of common salt at a concentration in the range 0.5—2% by weight of the emulsion, suitably 1% by weight.

Polyunsaturated fats are preferred as the edible fat component of the emulsion according to the invention since they are complementary to the fats occurring naturally in poultry meat and which are also polyunsaturated. Also polyunsaturated fats are less likely to go rancid and furthermore polyunsaturated fats are desirable from the point of view of diet and health considerations.

It will be appreciated that when the edible fat used is butter it will be necessary to include an antioxidant such as butylated hydroxyanisole (BHA) or butylated hydroxytoluene (BHT) or a mixture of these two antioxidants or other suitable antioxidant conventionally used with fats and oils.

The emulsion enters a pseudoplastic state within the body of poultry meat which resembles chewing gum and remains in this state until the set temperature of the stabilizer is reached during cooking. The set temperature of the stabilizer being approximately 50°C.

Although not wishing to be bound by any theoretical explanation of the invention, it would appear that the stability of the emulsion is due to the fact that there is a synergistic effect between the glycomannan and the hydrocolloid components of the stabilizer, since neither of them alone has a high cold viscosity.

When the stabilizer, whether present in the emulsion or not, is heated above the set temperature, the glycomannan and the hydrocolloid become fully soluble and the viscosity changes from the "synergistic pseudoplastic viscosity state" which is assumed by the stabilizer below the set temperature to a purely additive viscosity. When the latter state is reached, the fat globules coalesce and separate from the aqueous phase because the stabilizer no longer has a sufficient yield value to keep the globules separated. The yield value is a measure of the ability of the stabilizer to hold the fat globules permanently in suspension against the force of gravity.

The stabilizer must have a synergistic pseudoplastic viscosity in the cold state with a yield value which is sufficient to permanently suspend fat globules of a size produced by the shearing action of the mixer used.

When the emulsion according to the invention is used to treat a body of poultry meat prior to cooking by injecting the meat therewith, the meat and hence the depots of emulsion progressively reach the set temperature of the stabilizer during cooking from the outside in. Accordingly, there is a progressive release of fat for basting towards the end of cooking so that one simulates normal cooking procedures where one bastes towards the end of the cooking process with the juices produced by the meat.

When the emulsion breaks, the aqueous phase remains within the muscle so that succulent juices

are released at a late stage in the cooking process.

With known "self-basting" procedures the injected fat is released essentially throughout the cooking period.

It will be appreciated that an aqueous medium is present if required for the addition of polyphosphates so avoiding the possibility of phosphate insolubility and jamming of injection needles if polyphosphate is used, which has previously been encountered with known techniques of injecting poultry with polyphosphates.

The invention will be further illustrated by the following Examples.

#### EXAMPLE 1

0.1 parts of a 50:50 mixture of locust bean gum and xanthan gum (sold under the trademark FOODAID T) was added to 50 parts of cold chicken stock and mixed with a high speed mixer. One part of salt was then added with stirring followed by 50 parts of vegetable oil. The mixture was then emulsified in a high speed mixer to give a stable emulsion having pseudoplastic properties. Six raw, dressed chilled turkeys ranging in size from 5—12 pounds in weight were injected with 100 ml. of the emulsion prepared above. The emulsion was brought to a temperature greater than 50°C to convert it to a liquid state suitable for injection purposes. The turkeys were injected with a two-prong injection device with the individual prongs have a diameter of 3 mm. The device was introduced horizontally into the breast of each turkey. Upon withdrawal of the prongs, the emulsion was found to congeal immediately within the breast muscle and no emulsion oozed out of the injection site.

The six turkeys and a control which had not been injected were then frozen.

The frozen turkeys were later thawed to a carcass temperature of approximately 35°F. The skin of the breast was perforated by a fork and the turkeys were roasted at 375°F in an electric oven for a time dependent on the weight of the turkey.

When the turkeys were roasted they were evaluated by a panel of four for succulence, flavour, appearance and tenderness.

The turkeys which has been injected with the emulsion were rated as being far superior in all respects to the untreated turkey. Special comment was made by the panel on the appearance of the treated turkeys before carving which has a golden brown colour and basted appearance. In contrast, the control turkey had a dry appearance.

#### EXAMPLE 2

The procedure of Example 1 was repeated except that the stabilizer used was a 40:60 mixture of konjac gum and xanthan gum. Comparable results were obtained.

#### EXAMPLE 3

The procedure of Example 1 was repeated except that 10 turkey legs were injected with the emulsion. The roasted legs were evaluated by a



panel of four and were pronounced as being very succulent and tender compared with two control turkey legs.

#### EXAMPLE 4

- 5 The procedure of Example 1 was repeated except that the vegetable oil was replaced by 50 parts of liquefied butter which included an antioxidantizing amount of an equal mixture of butylated hydroxyanisole and butylated

10 hydroxytoluene.

Six treated turkeys and a control were roasted and were then evaluated by a panel of four for succulence, flavour, appearance and tenderness.

- 15 The turkeys which had been injected with the butter emulsion were rated as being far superior in all respects to the untreated turkey. Special comment was made by the panel on the excellent flavour of the treated turkeys.

#### CLAIMS

- 20 1. A stable oil-in-water emulsion which comprises an edible fat suspended in an aqueous medium and a stabilizer consisting of a mixture of a glycomannan and a polysaccharide hydrocolloid in a ratio of 10:90 to 90:10, said stabilizer being

- 25 present in a quantity sufficient to maintain the emulsion in a pseudoplastic state below the set temperature of the stabilizer.
2. An emulsion according to claim 1, wherein the glycomannan is a glucomannan or a

- 30 galactomannan.
3. An emulsion according to claim 1 or 2, wherein the glycomannan is a galactomannan.

4. An emulsion according to claim 3, wherein the galactomannan is locust bean gum.

- 35 5. An emulsion according to claim 1 or 2, wherein the glycomannan is a glucomannan.

6. An emulsion according to claim 5, wherein the glucomannan is konjac gum.

7. An emulsion according to any preceding
- 40 claim, wherein the polysaccharide hydrocolloid is xanthan gum or carrageenan.

8. An emulsion according to claim 7, wherein the polysaccharide hydrocolloid is xanthan gum.

9. An emulsion according to any preceding
- 45 claim, wherein the ratio of glycomannan to polysaccharide hydrocolloid is in the range 80:20 to 20:80.

10. An emulsion according to claim 1, wherein the stabilizer comprises equal parts of locust bean

- 50 gum and xanthan gum.
11. An emulsion according to any preceding claim, wherein the stabilizer is present at a concentration in the range 0.05—1% by weight.

12. An emulsion according to any preceding
- 55 claim, wherein the edible fat is a polyunsaturated fat.

13. An emulsion according to claim 12, wherein the polyunsaturated fat is a vegetable oil.

14. An emulsion according to claim 13,
- 60 wherein the vegetable oil is corn oil.

15. An emulsion according to any one of claims 1—11, wherein the edible fat is a saturated fat.

16. An emulsion according to claim 15, wherein the saturated fat is butter.

- 65 17. An emulsion according to claim 15 or 16, wherein the emulsion includes an antioxidant.

18. An emulsion according to claim 17, wherein the antioxidant is butylated hydroxyanisole or butylated hydroxytoluene or a mixture thereof.

- 70 19. An emulsion according to any preceding claim, wherein the edible fat is present at a concentration in range of 30—70% by weight.

20. An emulsion according to any preceding claim, wherein the aqueous medium includes a
- 75 phosphate material.

21. An emulsion according to claim 20, wherein the phosphate material is a polyphosphate material.

22. An emulsion according to any preceding
- 80 claim, wherein the aqueous medium is a poultry stock.

23. An emulsion according to any preceding claim which includes common salt at a concentration in the range 0.5—2% by weight.

- 85 24. A composition for the injection of a body of poultry meat to improve the organoleptic properties thereof, which composition comprises an emulsion as claimed in any one of claims 1—23.

- 90 25. A composition according to claim 24, wherein the body of poultry meat comprises a raw, dressed poultry carcass or a portion thereof.

26. A composition according to claim 24, wherein the body of poultry meat comprises pre-
- 95 formed poultry meat.

27. A composition according to any one of claims 24—26, wherein the poultry meat is turkey.

28. A composition according to any one of claims 24—26, wherein the poultry meat is
- 100 chicken.

29. A process for preparing an emulsion as claimed in any one of claims 1—23, which comprises mixing the edible fat, aqueous medium and stabilizer in a high speed shear mixer.

30. A method for treating a body of poultry meat as defined in any one of claims 24—28, which method comprising injecting into said body, which has a temperature less than 40°F, an
- 105 emulsion as claimed in any one of claims 1—23.

31. A method according to claim 30, wherein the body of poultry meat is injected with the emulsion at a concentration of less than 20% by
- 110 weight.

32. A method according to claim 30, wherein the body of poultry meat is injected with the emulsion at a concentration in the range 1—10% by weight.

33. A method according to claim 30, wherein the body of poultry meat is injected with the emulsion at a concentration of 2.5% by weight.

34. An emulsion according to claim 1, substantially as hereinbefore described with particular reference to the accompanying
- 120 Examples.

35. A composition according to claim 24, substantially as hereinbefore described with

particular reference to the accompanying  
Examples.

36. A process according to claim 29 for  
preparing an emulsion, substantially as  
5 hereinbefore described with particular reference to

the accompanying Examples.

37. A method according to claim 30 for treating  
a body of poultry meat, substantially as  
hereinbefore described with particular reference to  
10 the accompanying Examples.

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